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CLAIMS

1. Device for broadband transmission of digital optical signals between at
5 least one first unit and at least one second unit traveling relative to the first unit
along a given track, the device comprising, in association with the first unit:

- a data source for generating a serial data stream;
- an optical transmitter for generating optical signals from the serial data
stream of the data source;
- 10 - an optical waveguide for guiding the optical signals generated by the
optical transmitter;

and also comprising, in association with the second unit:

- a coupling element for tapping optical signals from the optical waveguide;
- an optical receiver for receiving the signals tapped by the coupling element;
- 15 - a data sink for further processing the signals received by the optical
receiver;

wherein a controller is provided for controlling the data stream, the controller
signaling, by means of a desired value, a predetermined data rate or package size
selectively either to the data source or to the optical transmitter.

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2. Device for broadband transmission of digital optical signals between at
least one first unit and at least one second unit traveling relative to the first unit
along a given track, the device comprising, in association with the first unit:

- a data source for generating a serial data stream;
- 25 - an optical transmitter for generating optical signals from the serial data
stream of the data source;
- an optical waveguide for guiding the optical signals generated by the
optical transmitter;

and also comprising, in association with the second unit:

- 30 - a coupling element for tapping optical signals from the optical waveguide;
- an optical receiver for receiving the signals tapped by the coupling element;

- a data sink for further processing the signals received by the optical receiver;

wherein a controller is provided for controlling the data stream, the controller being disposed between the data source and the optical transmitter and

- 5 converting the data of the data source in accordance with a desired value to a predetermined data rate or to packages of predetermined package size.

- 3. Device according to claim 2,

wherein the controller comprises means for storing data, and also for issuing
10 stored data at different data rates to the transmitter.

- 4. Device according to claim 1 or 2,

wherein the desired value is set by a desired-value setting-means according to the actually prevailing transmission characteristics of the data path between the
15 optical transmitter and the optical receiver, or according to another measured parameter.

- 5. Device according to claim 1 or 2,

wherein

- 20 - an evaluation means is provided between the optical receiver and the data sink;
- the evaluation means has additional means for signaling incorrectly transmitted data to the controller by means of an auxiliary transmission channel; and
- 25 - the controller is adapted to repeat a transmission of incorrectly received data packages upon request by the evaluation means.

- 6. Device according to claim 1 or 2,

wherein a microcontroller is provided for control and diagnosis of the
30 device.

7. Device according to claim 1 or 2,
wherein the device is self-learning and during operation dynamically adapts to
currently prevailing operating conditions.

5 8. Method for broadband transmission of digital signals between at least one
first unit and at least one second unit traveling relative to the first unit along a
given track, the method comprising the steps of:

- generating from a data source at the first unit a serial data stream;
- generating optical signals from the serial data stream of the data source
10 with an optical transmitter at the first unit;
- guiding the optical signals generated with the optical transmitter along an
optical waveguide;
- tapping optical signals from the optical waveguide with a coupling element
at the second unit;
- 15 - receiving the optical signals tapped with the coupling element with an
optical receiver at the second unit;
- further processing the signals received by the optical receiver at a data sink
at the second unit;

20 wherein the method comprises the following further steps, performed dynamically
during operation:

- determining at least one parameter which is representative of actually
prevailing transmission characteristics of a data path between the
transmitter and the receiver;
- forming a desired value of a data rate or data package size from the
25 determined at least one parameter;
- setting a data rate or a size of data packages for transmission along the
data path in accordance with the desired value;
- transmitting a data stream at the set data rate or size of data packages
along the data path to the receiver.

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